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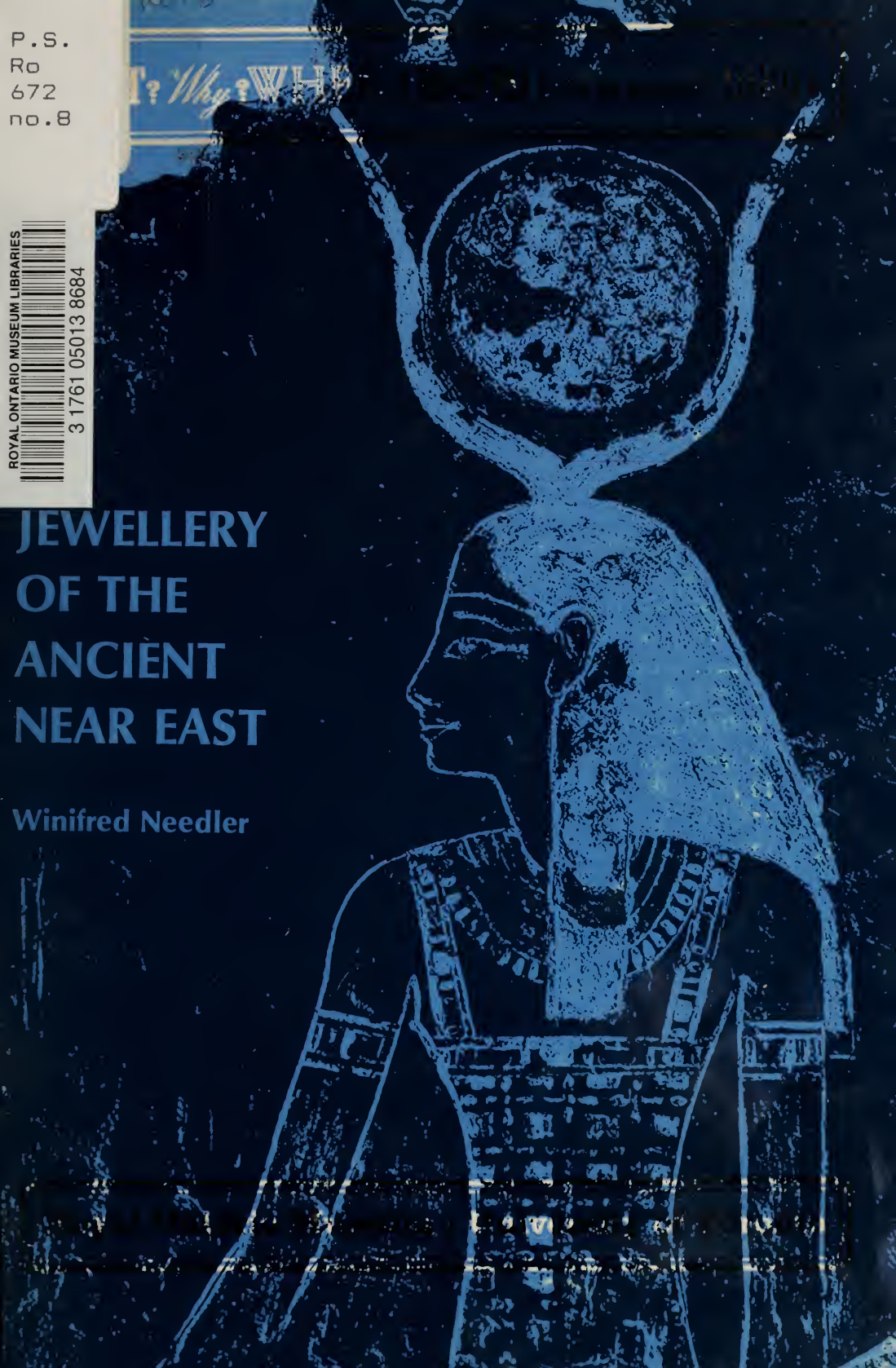
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JEWELLERY OF THE ANCIENT NEAR EAST

Winifred Needler



I keep six honest serving-men

(They taught me all I knew);

Their names are WHAT and WHY and WHEN

And HOW and WHERE and WHO.

RUDYARD KIPLING

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WHAT? HOW?

Why? WHERE?

WHEN? WHO?

Jewellery of the Ancient Near East

by WINIFRED NEEDLER

Why was the earliest jewellery made?

The desire for self-adornment is common to all mankind, and we can guess that our earliest human ancestors possessed the rudiments of jewellery to impress their lovers, friends and enemies. People of the Old Stone Age must have wrapped themselves in animal skins and perhaps in plaited fibres such as grass and mammoth's hair. None of this simple clothing has survived; only bone needles suggest that it was sewn. Beads are generally made of less perishable material, and therefore it is not surprising that the earliest known ornaments are older than the earliest known clothing. The Royal Ontario Museum has some simple beads of stone, bone, shell and teeth made towards the close of the Old Stone Age, when men were still merely hunters and food-gatherers, and during the food-producing New Stone Age, which developed in the Near East before 8000 B.C., resulting in the earliest known village communities.

From these early times other motives besides vanity probably prompted men and women to wear ornaments. As do primitive peoples today, they may have believed that beads and pendants would protect their owner and his possessions from mysterious powers through the magic of form and material. In time the ornamental value of these amulets might eclipse the

superstitions connected with them. Moreover, small portable objects of value would be worn for safety or convenience and would gradually assume decorative importance. Clothing and ornaments were probably secured with strings, thongs of rawhide, or real or imitation thorns, the earliest pins. Other strings around the head and waist, prototypes of the fillets and girdles so prominent in later jewellery, must have been necessary to curb billowing hair and bulky garments. While various motives may thus have played a part, the simple ornaments surviving from these distant times suggest that vanity, superstition and practical considerations were always linked with an instinctive interest in colour and symmetry for their own sakes.

WHEN were advanced jewellery techniques invented?

True jewellery can scarcely be said to have existed until the discovery of metals and how to work them. The first use of metals did not come until long after the beginnings of agriculture, which brought life in small settled communities and consequently many technical advances. Copper and gold, for small ornaments and pins, were the earliest metals to be worked. At first they were fashioned in much the same way as stone but by 3500 B.C. well-cast copper implements were in general use in Mesopotamia. They represent the beginning of advanced metal-working techniques. Where this skill developed is uncertain, perhaps in the Iranian hills near the southern end of the Caspian Sea. The Sumerians, who are credited with the invention of writing and the organizing ability which resulted in the development of city civilization, may have brought it with them when they settled in lower Mesopotamia.

During the second half of the fourth millennium B.C., in both Mesopotamia and Egypt, stone and metal jewellery became more complex, and fine ivory carving was also used. The materials of amulets, beads and other ornaments afford interesting proof of widespread trade; for example, lapis lazuli came from Afghanistan to West Asia and even, through indirect channels, to Egypt. In some areas, a vitreous glaze was used, first on stone beads and then on powdered quartz mixed with an adhesive (probably a native soda); this glazed powdered quartz, or "faience," became important in the later development of Egyptian jewellery.

A little before 3000 B.C., the primitive society which produced these simple ornaments became organized into the earliest known centres of civilization. The rise of cities brought an accumulation of great wealth, which encouraged the production of exquisite jewellery. The new complex society was based on the development of intensive agriculture in Mesopotamia (which led the way by a century or two) and in Egypt, both great river valleys where surplus crops were produced by means of irrigation



Ivory comb, decorated with an antelope in outline, was worn in Egypt about 3500 B.C. Present length about 5 in.

planned and carried out on a national scale. The jewellers employed by kings, courtiers and high priests quickly became skilled and sophisticated artists. The great mass of the population continued to live in poverty and simplicity, wearing much the same simple ornaments and amulets as before.

WHERE was the finest ancient Near Eastern jewellery found?

Our knowledge of ancient Near Eastern jewellery comes from isolated pieces found at a large number of excavated sites and from a few spectacular finds: treasures, hoards and intact royal burials. With further excavation, therefore, some of our ideas about the history of the craft may be revised. Yet it is clear that the finest and most original pieces generally reflect the wealth and power of the state as manifest in other finds of the same period, including written records. At the beginning of history strong traditions developed which survived for 2,000 years; at the same time there were always variety and inventiveness, and assimilation of foreign designs. Technical knowledge travelled further and faster than style; most of the common techniques of the goldsmith today were widely practised in the 3rd millennium B.C. Egypt, because of its dry climate and its unique burial customs, has left us most information about the ancient jeweller's craft.

The skill of the early Sumerians in working gold, silver, copper and semi-precious stones is well known from the 4th-millennium temple at Tell Brak, north of the Khabur Valley, a tributary of the upper Euphrates. This temple is a clear example of the far-flung influence of Sumer, centred in southern Mesopotamia, at the beginning of history.

If Egypt received her first impulse towards civilization from Mesopotamia at this period she soon overtook Sumer. The sophisticated jewellery of the earliest kings of Egypt from Abydos and Saqqara (about 3000 B.C.) reflects this rapid rise, and the intact secondary burial of Queen Hetep-heres, mother



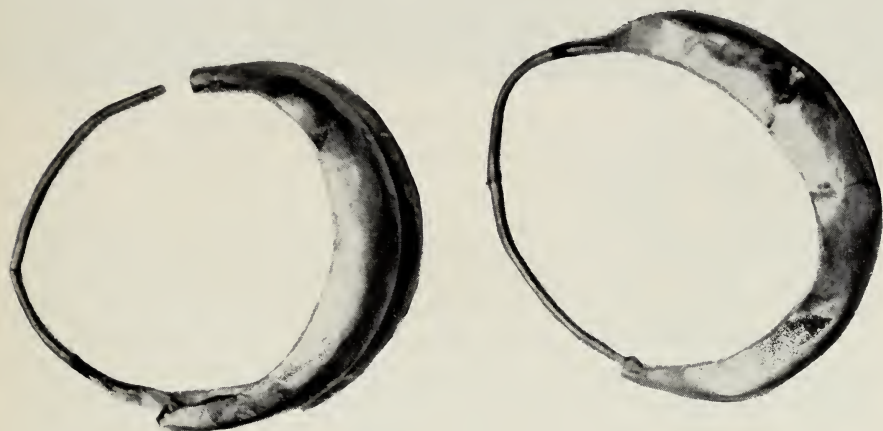
Sumerian jewellery from the "Royal Cemetery" at Ur, about 2500 B.C., was worn by persons buried alive at a funeral. TOP Collar of triple-perforated beads, of lapis lazuli alternating with punched and soldered sheet-gold. Width about 1 in. MIDDLE Gold chain of interlocking folded rings to secure a man's headdress, with faceted gold forehead bead between small beads of carnelian and large beads of lapis lazuli. Length of chain about 15½ in. BOTTOM Wreath of "beech leaves" of chased sheet-gold, separated by lapis lazuli and carnelian beads. Leaves about 1¾ in. long. (Lent by the University Museum, Philadelphia)

of Cheops, at Giza has given us a glimpse of the luxury and refinement of court life in the Pyramid Age (about 2640 B.C.). That the famous goldsmith's work of slightly later date from the "Royal Cemetery" at Ur (about 2500 B.C.) seems inferior to this royal Egyptian work is not surprising since at that time Egypt was the most extensive and most highly organized united kingdom the world had known.

Nothing so spectacular as this jewellery from Ur is as yet known from later Mesopotamia or from the highland regions to the north and northwest which supplied the cities of the plains with raw metals and inherited Sumerian culture. Scattered finds suggest that goldsmiths in West Asia continued in the Sumerian tradition for many centuries, developing original and distinctive styles (finds at Tell Asmar, Tepe Hissar, Alaça Hüyük and Hisarlik, all second half of 3rd millennium B.C., and at Uruk, about 2000 B.C.,



More jewellery from the "Royal Cemetery" at Ur: The earrings were made by soldering two hollow lobes of sheet-gold together, and have a curved gold pin. Diam. about $2\frac{1}{4}$ in. The silver pin has a head of lapis lazuli mounted in sheet-gold. Length $6\frac{1}{2}$ in. (Lent by the University Museum, Philadelphia)



and Ashur, 13th century B.C.). Ornaments of the 2nd millennium B.C. excavated in Syria and Palestine are often interesting cultural hybrids showing the imperial influence of Egypt on local styles and occasionally traces of Aegean connections (Byblos, Ras Shamra and Megiddo). In the 14th century the Hittite Empire to the north (about 1500 to 1200 B.C.) inherited the advanced metal industry of the North Syrian kingdom of Mitanni; the few pieces of Hittite gold and silver work so far found (from Alalakh, Carchemish, Bogazköy and other sites) are remarkably fine. Splendid gold jewellery has recently been excavated from tombs of illiterate chieftains at Marlik near the southern shore of the Caspian Sea; these tombs probably belong to the two centuries following the collapse of the Hittite Empire, a dark period of chaos and barbarian migrations in eastern Mediterranean regions.

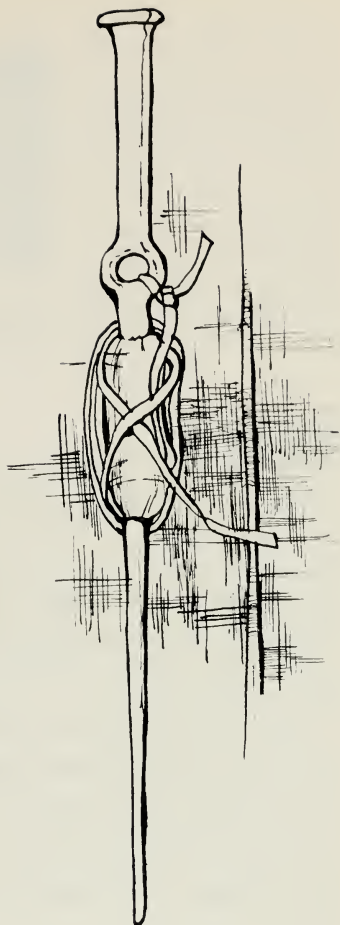
Most of the known jewellery of the 2nd millennium B.C. and the most exquisite examples of it were discovered in the cemeteries of Egyptian royalty. The high period was the 12th Dynasty (20th–19th century B.C.), known mostly from the royal cemeteries at Lahun, Dahshur and Lisht. Palestine and Syria were then under the influence of Egypt; in tombs of princes of Byblos, near modern Beirut, were found gifts of Egyptian jewellery from 12th-Dynasty kings, probably their political overlords, and Egyptian-inspired pieces made by local Syrian craftsmen. Far more jewellery



Fragment of gold overlay found at Ziwiyeh, Iran, and dated to about 700 B.C. Worked in repoussé and finished with chasing, it shows a sacred tree and fantastic animals. Length 4½ in.

has survived, however, from the Egyptian Empire (1570 to about 1160 B.C.), the period of Egypt's greatest political expansion. Silver, which does not occur naturally in Egypt, was imported from the north. Gold, which had been extensively mined in the Eastern Desert and in Nubia since the Pyramid Age, now poured into the capital from Egypt's vast southern dominion (northern Sudan). The most spectacular finds, including Tutankhamun's famous treasure (mid-14th century B.C.), come from royal cemeteries at Thebes, then the cosmopolitan capital of the ancient world. A rich treasure of gold and silver vessels and jewellery from the Ramesside period (13th century B.C.) was found in the temple area at Bubastis in the Delta. That the wonderful traditions of Egyptian jewellery lived on in the 1st millennium B.C. is evident from metalwork and jewellery found in the royal tombs at Tanis (11th–10th century B.C.) and from widely scattered work of the 7th and 6th centuries B.C. when, under the threat of Assyria, Egyptian nationalism revived and looked for inspiration to Egypt's great past.

Surprisingly little personal jewellery has been found in the capitals of the great Assyrian Empire of northern Mesopotamia which dominated the Near East from the 10th to the 7th century B.C. The scarcity of gold and silver personal ornaments contrasts with the wealth of exquisite carved and gold-embellished ivory plaques for decorating furniture; but at Nimrud a few fine pieces of jewellery were excavated. Splendid jewellery from the period of the Assyrian Empire has been found in the metal-rich highland regions of Anatolia, Armenia and western Iran (Gordion, Karmir Blur, Hasanlu and other excavated sites and the well-known illicit finds of the Ziwiyeh treasure and Luristan bronzes). Little of the magnificent jewellery surviving from the Persian Empire (549–331 B.C.) has been recovered from properly excavated sites (Susa, Pasargadae).



LEFT Silver pin, about 8 in. long, from Luristan, Iran, was made about 800 B.C. The hollow head, in the form of three birds, is cast; the whole upper part is engraved. CENTRE From the same time and place, but made of bronze, this pin has a cast head in the form of a stylized lion. The tail forms an eye for attaching a string or chain. Length about 6 in. RIGHT How the perforated garment pins were used. This form of pin was fashionable in West Asia from the early 2nd millennium B.C.



Bronze safety-pin brooch, from Nimrud, the Assyrian capital Calah, 8th or 7th century B.C. About 1 in. long.

This is an impression of a cylinder seal which an Assyrian used for signing documents written on clay tablets, about 700 B.C. By rolling the seal on a soft surface the "signature" can still be produced: man-headed sphinxes and the symbol



of the god Marduk, with winged disk above and fish below. The seal is chalcedony, cut with wheel and drill. Length $9/10$ in., diameter $1/2$ in.

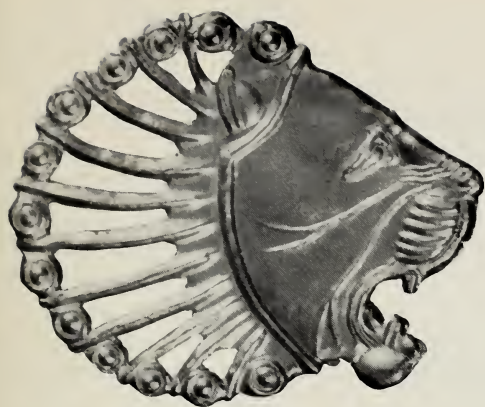
WHAT are some fine examples of ancient Near Eastern jewellery?

All the jewellery illustrated in this booklet is in the Royal Ontario Museum, where it should be seen at first hand to enjoy its colour harmony, delicate detail and skilful technique. Some outstanding pieces, mostly conserved in the great museums of the Near East, are mentioned here, first those from West Asia and then those from Egypt. These two main jewellery traditions remained distinct for 2,000 years in spite of increasing contacts and many mutual influences.

The wreath of gold "beech leaves" on page 4 is part of an elaborate head-dress which included flowers set with carnelian and lapis lazuli, worn about 2500 B.C. by ladies of Ur. They also wore the huge crescent-shaped earrings, and the gold and lapis lazuli "collar". Both men and women fastened their cloaks at the shoulder with a large gold or silver pin. Among other types of jewellery found at Ur were gold and silver bracelets and belts, inlaid finger-rings, bead necklaces in a wide variety of combinations with precious materials, gold daggers, and cylinder seals in elaborate settings.

Among the gold objects of the Ziwiye treasure from northwestern Iran (about 700 B.C.) are beautifully decorated pectorals, torques, bracelets and daggers. This jewellery, made by local craftsmen who used the traditional eclectic motifs of the Assyrians, is illustrated on page 6 by a small fragment of gold overlay, originally part of a large plaque which perhaps decorated a ceremonial garment. Roughly contemporary with it are bronze, and occasionally silver, ornaments of related but more imaginative style from Luristan, western Iran. The fine silver pin on page 7 has a plain shaft, like the much earlier pin from Ur. With it are shown two other types of garment pin: the perforated type and the more efficient fibula (safety-pin brooch) which superseded it.

Scenes from the relief-sculptures that decorated Assyrian palaces show clearly styles of jewellery in vogue during the first millennium B.C.: elabo-



Lion's head, cut out of thin sheet-gold and worked in repoussé, was sewn through rings at the back to garments or hangings. Made during the Persian Empire, about 400 B.C. Greatest length 2½ in.

rate pendent earrings, massive metal armlets, simple bead necklaces sometimes carrying a heavy pectoral ornament, and headbands and bracelets usually decorated with large rosettes.

Cylinder seals, invented in Mesopotamia before 3000 B.C. and still used throughout West Asia in the 1st millennium B.C., illustrate the skill of the ancient lapidary. They are the ancestors of the engraved gems which became so popular in the Roman Empire and which have been almost continuously produced through mediaeval and modern times. Cylinder seals served principally as signatures on the clay tablets that were the usual documents of West Asia for more than 2,000 years; about the 7th century B.C. they were gradually superseded by stamp seals which were better adapted to papyrus and parchment. Cylinder seals were usually, but not always, made of stone, often with their ends set in metal caps. They were perforated lengthwise and strung on a necklace or wristband, and were often highly decorative.

Magnificent bracelets, necklaces, daggers and other jewellery of the Persian Empire (549–331 B.C.) were lavishly worked in gold and enriched with coloured stones. Here is the same love of fantastic animals seen in the work of earlier Indo-Iranian chieftains related to the Persians, and at the same time all the cosmopolitan skill at the command of the world-conquerors. The destruction of this last and greatest of the empires of the ancient Near East by Alexander the Great brought Near Eastern jewellery into the direct current of Greek civilization.

Only a few of the countless wonderful finds of jewellery in Egypt can be mentioned here. Four bracelets of gold and semi-precious stones bearing the name of King Djer show that the royal goldsmiths of about 3000 B.C. had advanced knowledge of decorative casting, filigree work and soldering. The gold and silver household objects of Queen Hetep-heres are unsurpassed in purity of design and perfection of technique. Two graduated sets

of bracelets in their gold jewel-box, the only surviving examples of her personal jewellery, are of hollow silver with a delicate dragon-fly design inlaid with turquoise, lapis lazuli and carnelian.

Among the exquisite jewellery of princesses of the 12th Dynasty are gold pectoral ornaments with elaborate designs worked out in fine cloisonné inlay of semi-precious stones; gold diadems, one in the form of delicately interlaced flowers and berries in filigree and inlay work; and dainty gold pendants decorated with fine granulation. Bracelets, anklets and necklaces are provided with ingenious clasps. One of the beautiful composite girdles has large hollow gold elements in the form of double lion's heads containing tinkling pellets. A lady of private rank of the same period wore a simpler circlet of fine twisted gold wire above rows of gold rosettes (similar to that below) sewn to the locks of her wig.



Egyptian rosettes of sheet-gold, perforated for sewing on to a wig or textile, were punched in quantity between an upper and lower die. This example is probably 20th or 19th century B.C. $\frac{3}{8}$ in.

Jewellery of the Empire period usually lacks the restrained beauty and technical perfection of 12th-Dynasty work. Among the lavish jewellery of three minor wives of Tuthmosis III (early 15th century B.C.) is a flexible head-dress of inlaid gold elements which entirely covered a long voluminous wig, and a second head-dress consisting of bands of heavy sheet-gold decorated with inlaid rosettes and, in the centre of the forehead, two gold gazelle heads.

Collars, necklaces and bracelets made up of many-coloured beads of gold and semi-precious stones were fashionable at all periods, and coloured faience became an increasingly common substitute for stone beads. Faience beadwork reached its peak of perfection about the time of Tutankhamun as is evident in the beautiful collar, probably from a private house, shown on page 14. Finger-rings were worn from at least as early as the 12th Dynasty. They mounted swivel-seals usually in the form of scarabs (sacred beetles) or plaques; solid metal signet-rings developed from this type about the time of Tutankhamun. Earrings were first worn in the Empire period and in a great variety of forms, including a plain hoop. As ancient Egyptian dress was always wrapped and tied, not tailored, garment pins were not worn.

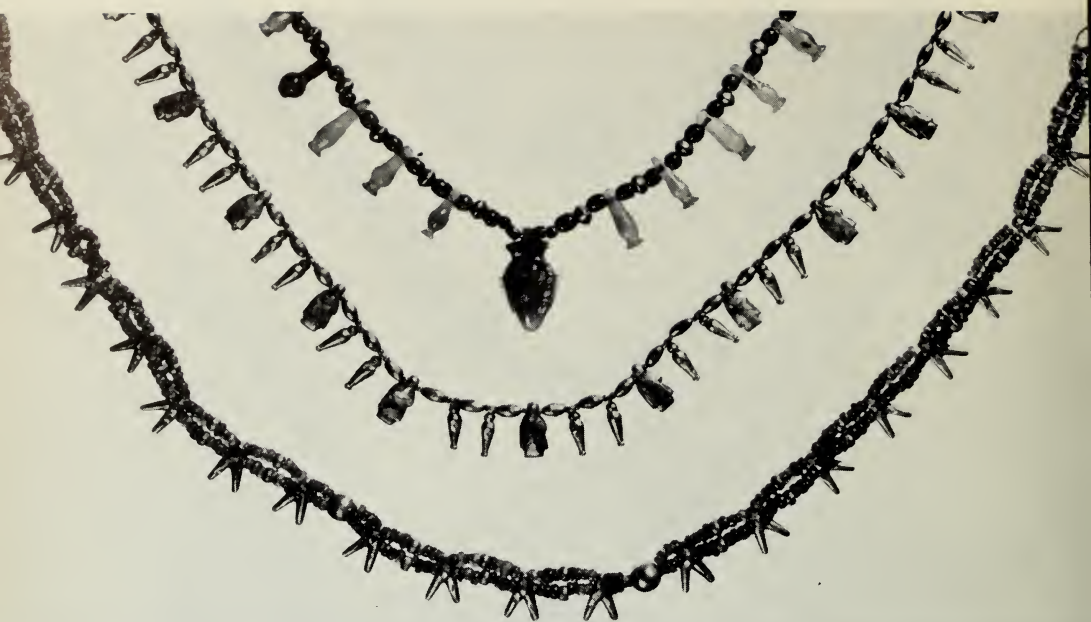
Jewellery from the tomb of Tutankhamun eclipses all other finds in sheer lavishness, for this is the only known king's tomb from Egypt's periods of



Egyptian necklaces, about 2000 B.C. TOP Amethyst beads, with 10 gold spheroid beads and an engraved amethyst scarab; the gold beads were made of sheet metal punched into a hemispherical die, soldered, and burnished axially. CENTRE Graduated hematite beads. BOTTOM Beads strung with amulets in the form of a claw, legs, hippopotamus heads, falcons and "female sphinxes," in carnelian, amethyst and green feldspar. Length of the claw 1½ in.

greatness to escape serious plunder. The Tutankhamun jewellery is often over-elaborate, but a few pieces are superbly designed, and its exuberance is always impressive. By Tutankhamun's time foreign residents, particularly ladies of the royal harem and the foreign merchants and craftsmen who were swarming to Thebes, played an important part in the trend towards cosmopolitan tastes.

During the centuries following Tutankhamun the jeweller's craft declined, but there are some showy and interesting pieces from the period of the Ramesside kings. A barbaric fashion was to insert large discoid studs in the ear-lobe. Among the often excellent work of still later times are the ram's-head earrings on page 15, and tiny gold and silver figurines cast by the lost-wax process.



Egyptian necklaces, 16th to 14th century B.C. TOP Carnelian "poppy-fruit" pendants spaced between a gold biconical bead and two smaller carnelian beads; in the middle a carnelian "heart" pendant; the two halves of the gold beads were worked separately into a die and soldered. CENTRE String of barrel-shaped beads and pendants in the form of fish and vases, all gold; the pendants are made of two sheets, the punched front soldered to a flat back with vent-holes, and the eyelets are separately formed. BOTTOM Two strings of small carnelian beads which pass through gold beads in the form of a fly, made like the pendants in the string above and having two separate thread-holes; midway between each fly is either a pair of gold ring-beads or a large gold spheroid; the ring-beads are convex and fluted and are of gold-leaf over a hard faience or clay composition. Length of flies 7/16 in.

WHO wore this jewellery?

Some jewellery was made expressly for the funeral. It was not only of cheaper quality than the jewellery worn by the living but often differed in form. Thus Tutankhamun's mummy wore a standard set of pectorals with special powers to protect the dead. Yet he was lavishly supplied with jewellery that was certainly intended for his lifetime. Knowledge accumu-



Two bracelets from Egypt: TOP Double strands of carnelian, lapis lazuli, turquoise and gold beads in the form of conus shells are held together by carnelian recumbent lions; at each end are three gold cylinder beads; the gold shells and cylinders are gold leaf over a moulded pottery core. 20th–19th century B.C. BOTTOM A later one, probably 16th–14th century B.C., has three rows of garnet beads held together by gold spacers, each consisting of three cylinders soldered together; in each string, between spacers, are three detached gold cylinders. All the cylinders are sheet-gold with soldered seam. Both bracelets are about 5½ in. long.

lated through excavation and the study of ancient wall-pictures and texts makes it possible to distinguish the jewellery of the living, even though practically nothing survives outside the tomb. Jewellery was also made for the gods; their adornment was part of the daily ritual of temples, whose treasuries abounded in gold and silver, and whose workshops produced the finest products of the goldsmith. There is little doubt, however, that from the beginning fine jewellery was a mark of secular wealth and power. The Egyptian wall-pictures, from the Pyramid Age to the Late Period, show ladies decked out with bracelets, collars, girdles, and curled wigs decorated with circlets and other ornaments, all reflecting changing styles through the centuries. Men also wore jewellery, but usually with more restraint. In the Assyrian royal reliefs, on the other hand, the few women who appear wear far less jewellery than their lords.

Life at court and among the wealthy upper class that flourished at the centres of empire was luxurious: an infinite supply of well-trained servants, a town house, country estates, gardens, music, dancing and the best of food and drink. Then as now people were most interested in each other, and this jewellery must therefore have played an important part in their lives.



Collar of blue, yellow, green, red and white faience beads in the form of fruits, leaves and flowers was found at Amarna, Egypt, and dates from the 14th century B.C. The end-pieces, each 2¼ in. wide, are moulded in low relief as lotus blossoms.

HOW was it made?

Examination of the jewellery we have described shows that in both West Asia and in Egypt the ancient goldsmiths knew how to beat gold into thin sheets, to cut, hammer and draw it into fine wire that was used for coiling and plaiting into intricate patterns, to cast it into still more complicated shapes, to work fine surface patterns on it in repoussé with chased detail, to engrave it, to overlay it and to inlay it with semi-precious stones and glass. The technique of granulation (the soldering of hundreds of minute granules of gold to a flat or curved gold plate to form a pattern) had reached a high degree of perfection by the Egyptian 12th Dynasty and was foreshadowed by coarser work from the "Royal Cemetery" at Ur. Rosettes and other small units were mass-produced by stamping between an upper and lower die.

Mesopotamian cylinder seals were at first made of comparatively soft stones, such as limestone and serpentine, but with increasing skill through the centuries harder stone, such as hematite, quartz crystal and different forms of chalcedony were used. Before 1000 B.C., when iron tools became common, the engraving was done with copper gravers and drills; a bow was used for rotating a simple drill, and later (from about 1500 B.C.) for a cutting-disk as well. For hard stones an abrasive powder, probably emery, was always used with the tools.

The Egyptians excelled in working with beads, which they cut, drilled,



Egyptian finger-rings. Each has a separate swivel-seal pierced lengthwise for the decorative wire binding it to the hoop. LEFT Scarab of green-glazed steatite, inscribed with two hieroglyphs, is mounted on a hollow electrum ring. 16th century B.C. MIDDLE Blue faience plaque, bearing on each side the names of Tuthmosis III, is mounted on a hollow gold ring. Early 15th century B.C. RIGHT Lapis lazuli plaque, engraved on one side with the name of Ramesses II and on the other with that of his Hittite queen, is mounted on a solid silver ring. Early 13th century B.C. Length of plaque $\frac{3}{4}$ in. The earrings at FAR RIGHT probably date from the 11th–8th century B.C. The gold rami's head and crescent were formed separately with dies, each in two identical parts, finely soldered over a faience core. Repoussé detail was finished with chasing. $1\frac{1}{4}$ in. long.

ground and polished with skill, and combined for wonderful colour effect. Beads were never faceted until the Roman period. Sometimes, however, they were cut into elaborate three-dimensional forms, which are no less remarkable examples of gem-cutting than the cloisonné inlay. Beads also illustrate the use of faience, and its offspring true glass. In the Empire period faience for beads and pendants was especially popular as a cheap substitute for stone. Its plastic properties and bright colours were ideally suited to this purpose.

The Museum possesses a fragment of the wonderful 12th-Dynasty cloisonné work, which probably came from a pectoral ornament. It is a good illustration of the technique: minute inlays of semi-precious stones were set into cells formed by strips of sheet-gold soldered on to a gold plate. In later periods artificial stones of opaque glass often took the place of the inlaid stones; the glass was cut and ground to fit in the same manner as the stones. True enamel was unknown; rarely a kind of glass inlay was set into cloisons in a plastic or powder form, but not heated sufficiently to fuse with the metal.

The earliest known use of niello (a blackish metallic sulphide inlaid in a semi-liquid state) is in metalwork, probably of native Syrian craftsmanship, from the Byblos treasure contemporary with this 12th-Dynasty jewellery. Niello probably came to the Near East from the Aegean, and is thus one of the earliest technical contributions of the West to the East.

Fragment of cloisonné work: a bird's wing of lapis lazuli, turquoise and carnelian inlaid in cells formed by strips of sheet-gold soldered to a gold plate. The inlay, some of which is missing, is exceptionally delicate, the upper feathers being scarcely more than 1/16 in. long. The wing itself is 1 in. long. 20th–19th century B.C. The bird may have looked like the drawing at the right, adapted from a cloisonné pectoral of this period in the Metropolitan Museum.



Egyptian jewellery techniques, from the Pyramid Age to the end of the 2nd millennium B.C., are known from ancient wall-pictures of goldsmiths at work, and from their surviving tools and products. In paintings of the Empire period we can still see the ancient craftsmen drilling beads with a bow-drill (several drills were operated simultaneously with a single bow), stringing beads, grinding stones, working with a blow-pipe at a portable furnace (probably in the act of soldering), and engraving and polishing metal. Their chisels, knives, punches and simple cutting-saws were of copper in the 3rd millennium B.C. and of bronze in the 2nd. Their drill-heads were of stone, copper, and probably sometimes reed. They had no files, and their hammers—always stone—had no handles. Powdered quartz mixed into a paste was constantly used as an abrasive in drilling, grinding and cutting hard materials, and explains the effectiveness of these comparatively soft tools. Polishing was done with pieces of quartzite. Methods of casting metals must be inferred from the open and composite stone moulds that have survived and from technical examination of complex metal objects obviously made by the lost-wax process. The stone dies into which sheet metal was pressed are sometimes difficult to distinguish from the stone moulds into which molten metal was poured. Dies for stamping were probably made of bronze. The simplest and earliest way of making wire was to cut a narrow strip of sheet-gold and then to hammer it into a roughly rounded section; the evenness of some specimens suggests that wire thus made was sometimes further reduced by means of primitive draw-plates. Some Egyptian wire appears to have been made by coiling a wider strip lengthwise to form a spiral section, and then drawing it; this would not require as strong a draw-plate as the modern method.

Scribes, the intellectual snobs of ancient Egypt, looked down on metal-workers. A passage in an ancient school text-book runs “. . . but I have seen the coppersmith when he toils at the mouth of his furnace; his fingers are like crocodile skin and he stinks worse than fishes' eggs. And has every craftsman who uses a chisel any more rest than a plowman?” Nevertheless the social position of jewellers must have been important and the profession a lucrative one. The title “goldsmith” is common, and several goldsmiths had expensive tombs built for themselves.

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